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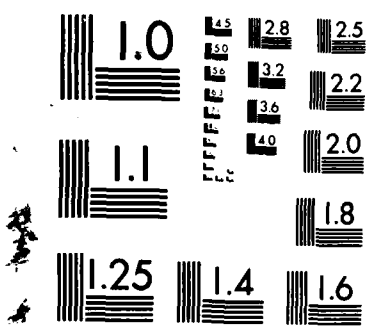

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EXPERT SYSTEM FOR SOFTWARE QUALITY ASSURANCE

USER'S MANUAL

November, 1986

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EXPERT SYSTEM FOR SOFTWARE QUALITY ASSURANCE

USER'S MANUAL

November, 1986

Prepared for

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This user's manual describes the execution of an expert system for Software Quality Assurance (SQA). The objective of the expert system is to capture the knowledge of experienced SQA engineers in order to properly tailor a Statement of Work. To achieve this, the process is divided into components which are all included in the batch file called SQA.BAT.

The primary component is the expert system, which was developed using the EXSYS development package shell. Before execution can begin the ~~following~~ files must be located in the same directory where EXSYS has been installed:

SQA.BAT -- the batch file

SOFT.RUL --
SOFT.TXT -- EXSYS files containing the expert system
SOFT.OUT --

SOW -- Master Statement of Work

READER.COM -- Turbo Pascal program to take the results of the expert system and contruct a tailored Statement of Work

In our application, the directory where EXSYS is installed is C:EXSYS. You may wish to call it whatever you like, but we shall refer to it in this manual as C:EXSYS. After logging on to the computer, change to the directory where EXSYS is installed:

C:\CD EXSYS

Execution begins by entering SQA at the prompt:

C:\EXSYS>SQA

PER FORM 50

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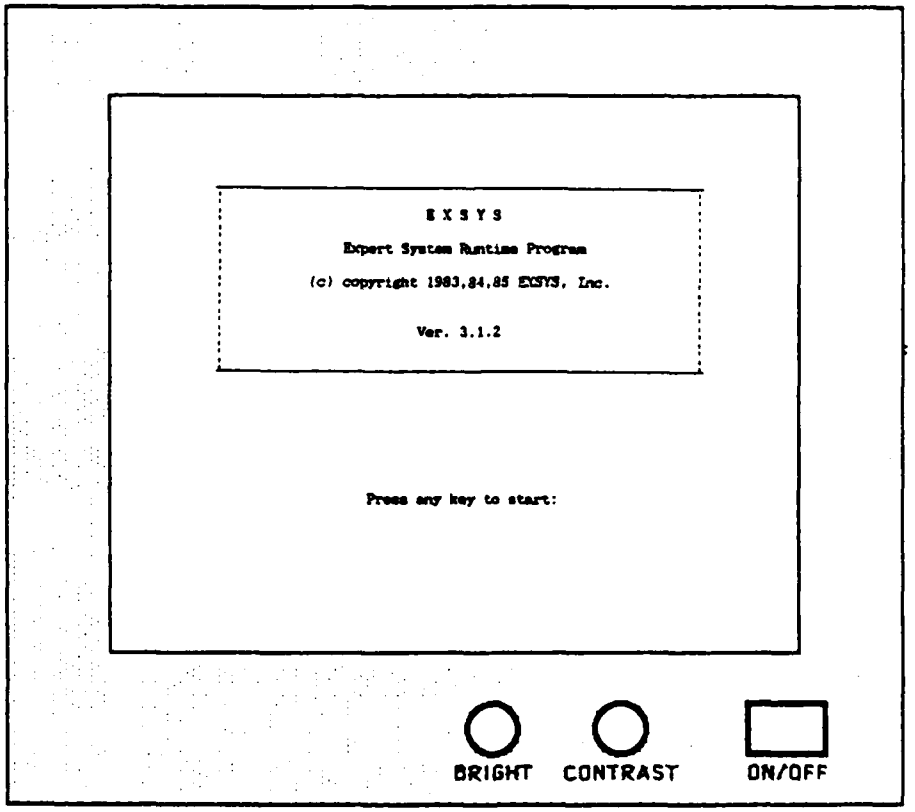
The batch file contains the following instructions:

```
EXSYS SOFT NOQUESTIONS FORWARD RECOVER
READER SOW RESULTS OUTFILE CDRL
COPY \EXSYS\OUTFILE \WS\OUTFILE
COPY \EXSYS\CDRL \WS\CDRL
CD \WS
WS OUTFILE
```

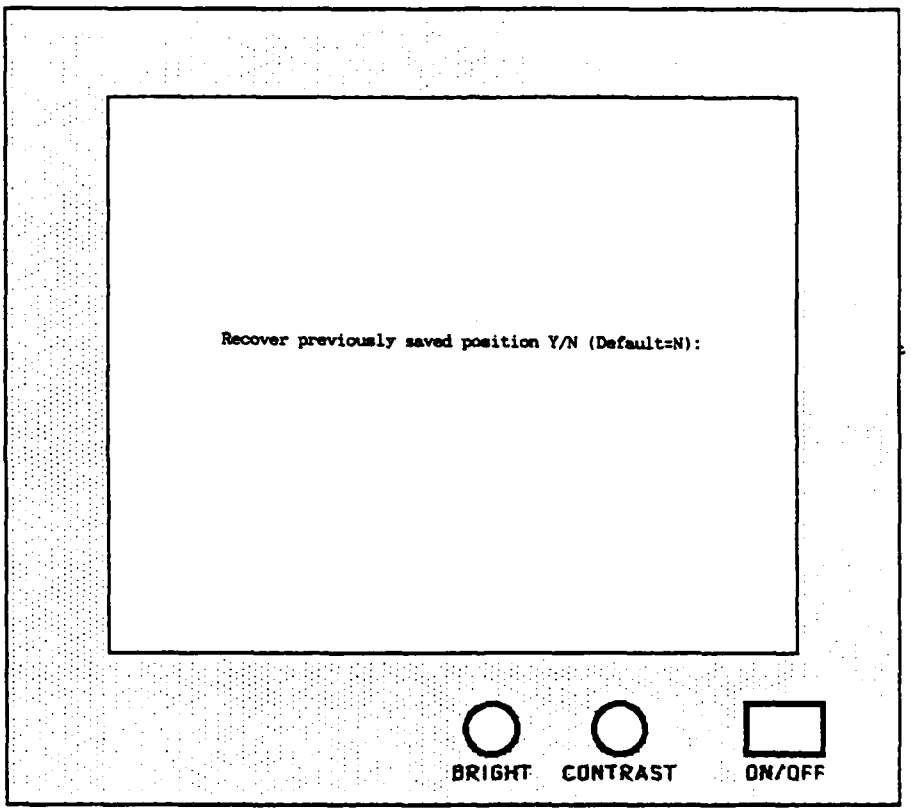
The first line calls up the expert system. The knowledge base and questions are stored in the files called SOFT.***. The other commands, NOQUESTIONS, FORWARD and RECOVER are EXSYS commands used to initiate the expert system.

After entering 'SQA', the user will see this on the screen:



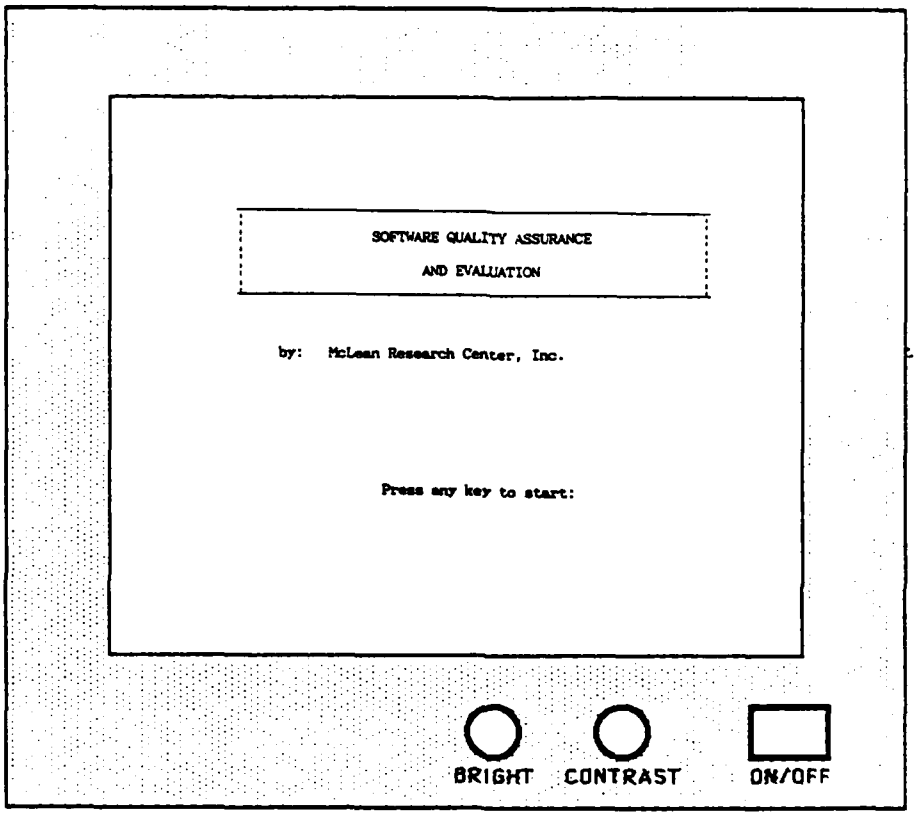
Press any key and the expert system will begin reading the rules. This takes approximately 30 seconds.

The program then asks if you want to recover a previously saved position:



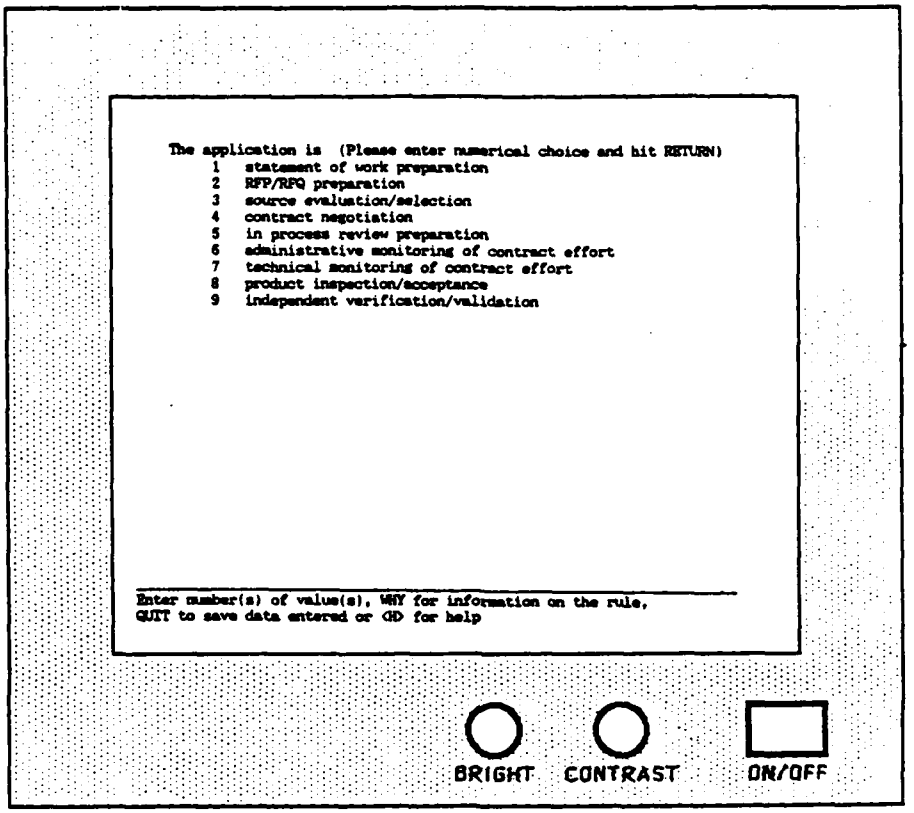
EXSYS has the capability of stopping in the middle of a session and saving the input up to that point. Then when the user returns to the system, he can pick up where he left off. Therefore, each time you start a session, you will be asked if you want to recover a previously saved position. If the answer is YES, then you will be asked for the file name that you had saved the input in.

The next screen the user sees is the title for the expert system:



Press any key to start the questioning. All the questions are in a multiple choice format. The user simply enters the number of his selection and hits RETURN. For some questions, more than one of the answers may be appropriate. If this is case, enter the numbers, separated by commas, and hit RETURN.

Here is the first question that the user is asked:



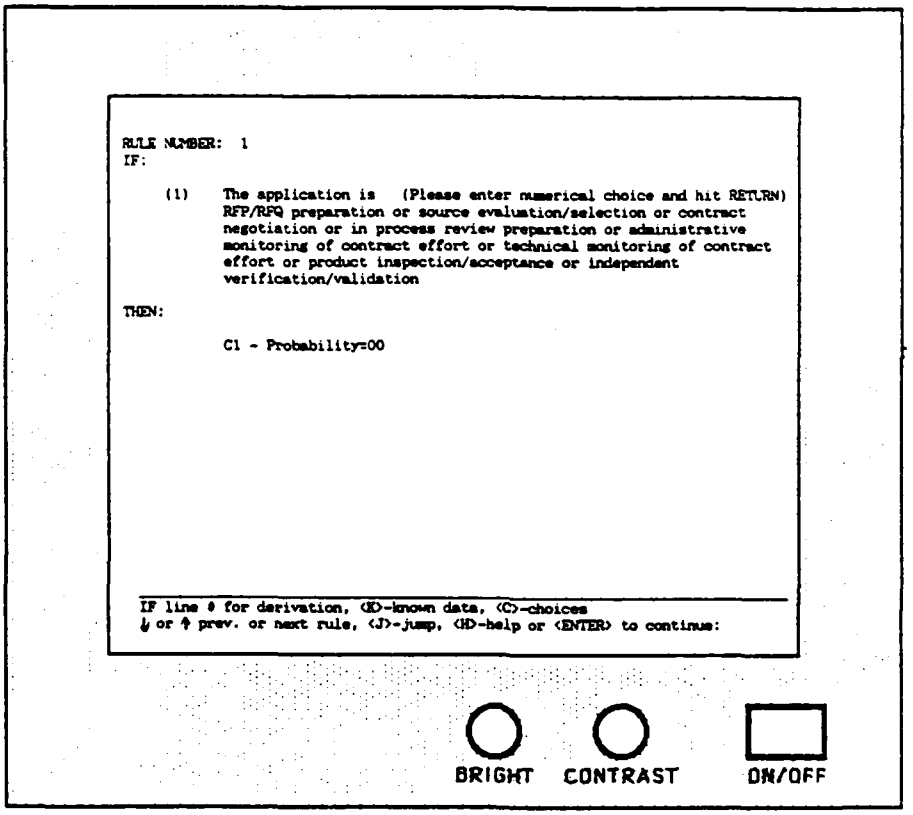
Notice that the bottom lines indicate the options the user can choose from. He can enter his selection(s), ask why, quit the session, or ask for help. These options are now further explained:

H -- Help; this calls up an EXSYS help menu which gives general information.

QUIT -- Quits the current session. The user will be asked if he wants to save his inputs to be used in a later session. If so, indicate a file name. This is the file that will be entered at the start of the next session to recover a previously saved position.

WHY -- This displays the rule(s) associated with the question in order to explain why the question is being asked and how it relates to the expert system.

When the user asks WHY, there will be another series of options to choose from. If the user asked WHY to the first question, here is what would appear:



This screen indicates that Rule Number 1 was used for this questions. As can be seen, the rules can appear to be very confusing to the uneducated user, and so it is recommended for the user to ignore the rules. However, on some of the rules (although not with this one) there is a NOTE section below the THEN statements. The NOTEs are included to provide additional information to help answer the questions. Unfortunately, the NOTEs can be viewed only with the rest of the rule.

The user now has the following options:

IF line # - for derivation of those statements

K - Known data; lists the values for all the variables

C - Choices; lists the values for all the choices

R - Reference; additional text or information about the rule

↓ ↑ - to view the previous or next rule

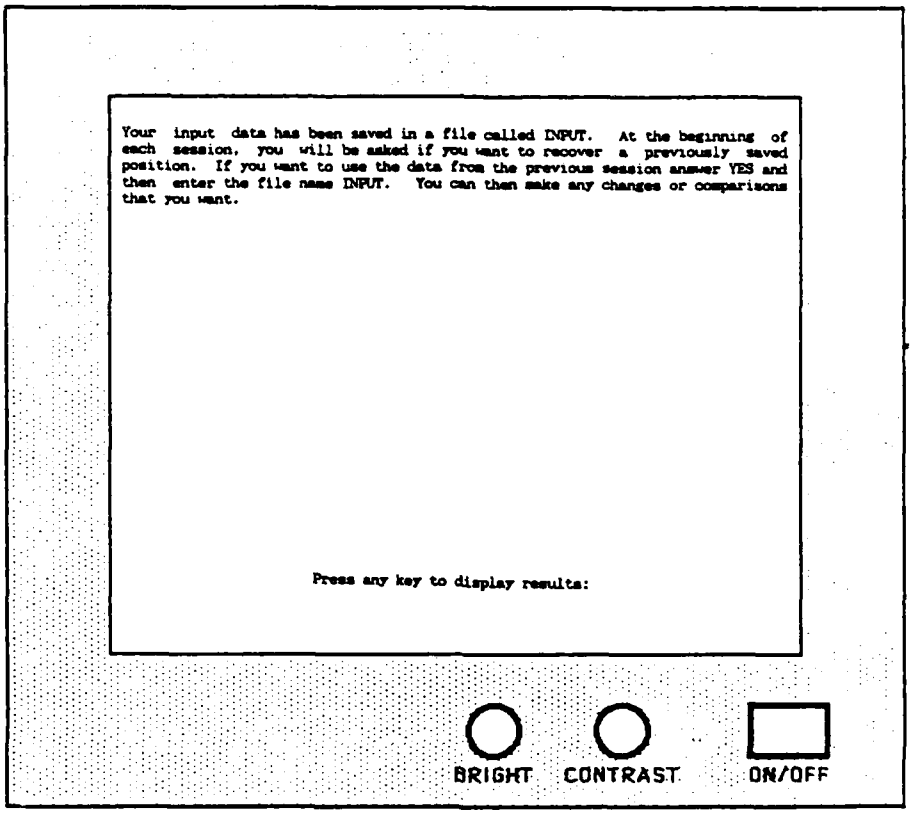
J - Jump; enter the number of the rule you wish to move to

H - Help; EXSYS help text

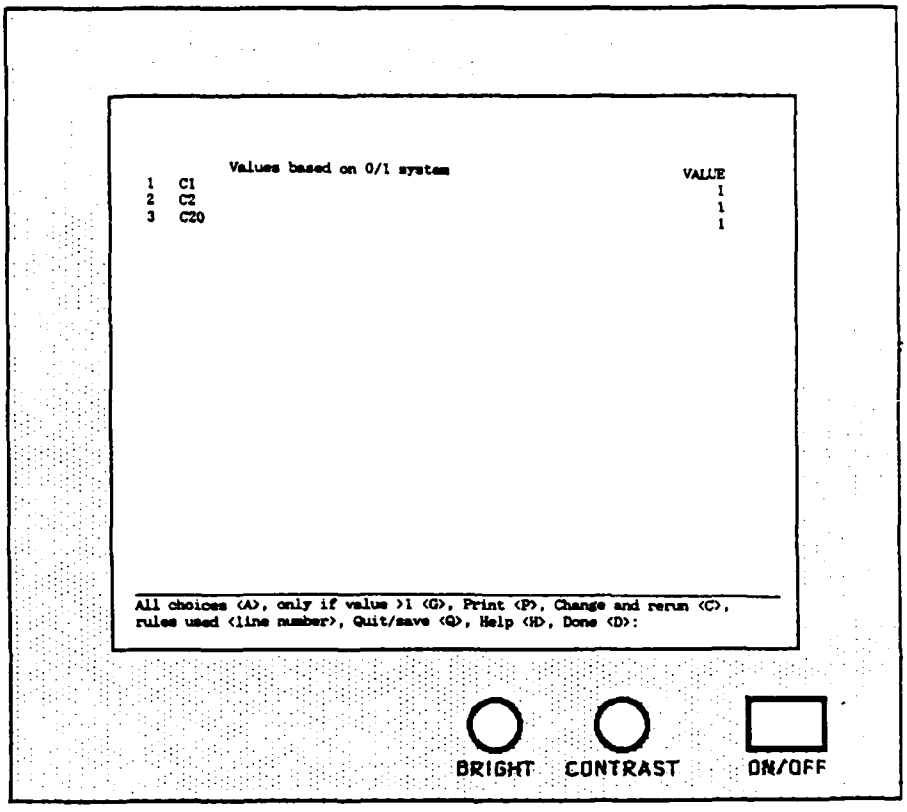
The user then continues through the questions until they have all been answered.

After the final question, the program sorts the results and writes the information to a file.

Then the following screen appears telling the user that all of his responses have been saved in the file INPUT.



Press any key to view the next screen which shows the results:



This is an example of possible results from an EXSYS run. EXSYS displays the results of all the choices whose value is greater than or equal to one. These values are not important to the user and he should not be concerned with them. The screen is displayed only to take advantage of the options available. They are as follows:

A - lists the values for all the choices. As stated above, these are of no concern to the user and should be ignored.

G - lists the values of the choices if greater than 1. Again, these are of no importance to the user.

P - Print; this enables the user to get a print out of all the questions and answers of his session, along with the variables and the choices.

C - Change and rerun; this allows the user to change one or more of his responses and rerun the program to observe any changes in the results. The previous results can be kept for comparison.

Q - Quit/save; exits both the expert system and the batch file.

H - Help; EXSYS help text.

D - Done; exits the expert system and continues with the batch file.

Further details and explanations about EXSYS and the expert system can be found in the EXSYS manual.

After exiting the expert system, the batch file calls up the program READER. This program is written is Turbo Pascal and uses the following files:

1. SOW - Text file containing the master Statement of Work. Here is a sample:

@10.00 STATEMENT OF WORK

@20.00 BRDEC SOFTWARE DEVELOPMENT AND SOFTWARE QUALITY EVALUATION

@100.00 SCOPE OF SOFTWARE DEVELOPMENT AND SOFTWARE QUALITY ASSURANCE TASKS

@200.00 General

This document delineates the Government's requirements for scientific, engineering, analysis, and technical services to support software development and software quality evaluation for BRDEC (Belvoir Research, Development and Engineering Center) mission-critical computer systems software.

@300.00 Scope of Work

The contractor shall provide all necessary personnel, supervision, management, materials, services, equipment, and facilities to perform software development and ..... etc.

2. RESULTS - the results from the expert system containing the numbers of the paragraphs to be included in the Statement of Work. Here is a sample:

914.000000
915.000000
917.000000
918.000000
921.000000
922.000000
1003.000000
1004.000000
1500.000000
2400.000000
2500.000000
3500.000000
3600.000000

3. OUTFILE - File created by READER containing the tailored Statement of Work. Here is a sample:

STATEMENT OF WORK

BRDEC SOFTWARE DEVELOPMENT AND SOFTWARE QUALITY EVALUATION

SCOPE OF SOFTWARE DEVELOPMENT AND SOFTWARE QUALITY ASSURANCE TASKS

General

This document delineates the Government's requirements for scientific, engineering, analysis, and technical services to support software development and software quality evaluation for BRDEC (Belvoir Research, Development and Engineering Center) mission-critical computer systems software.

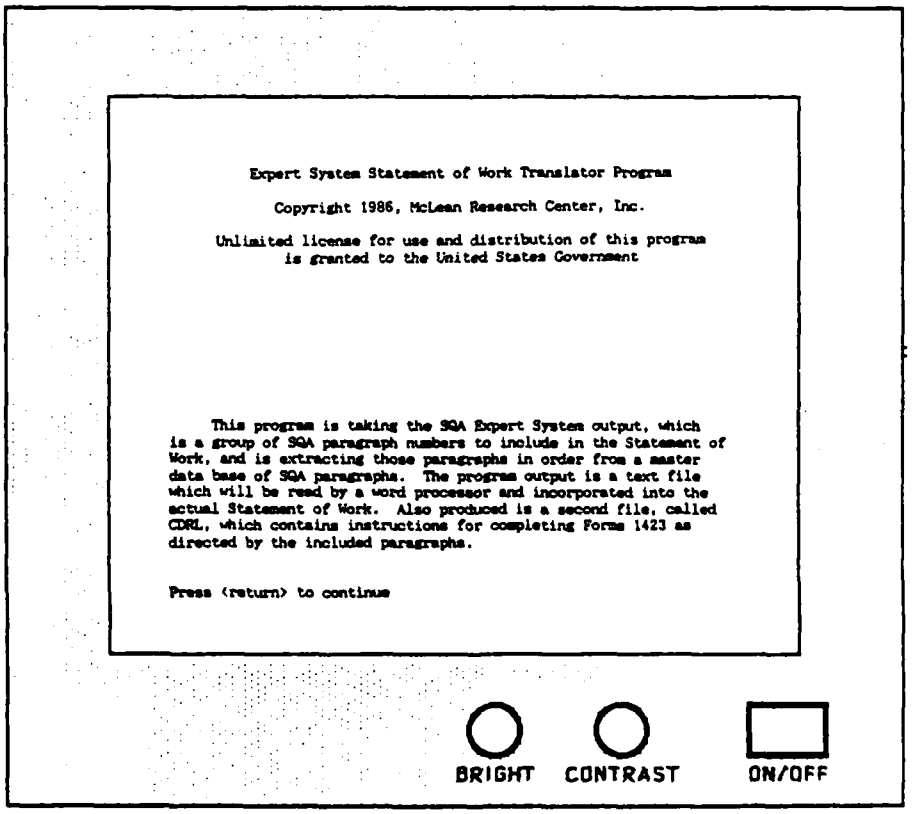
Scope of Work

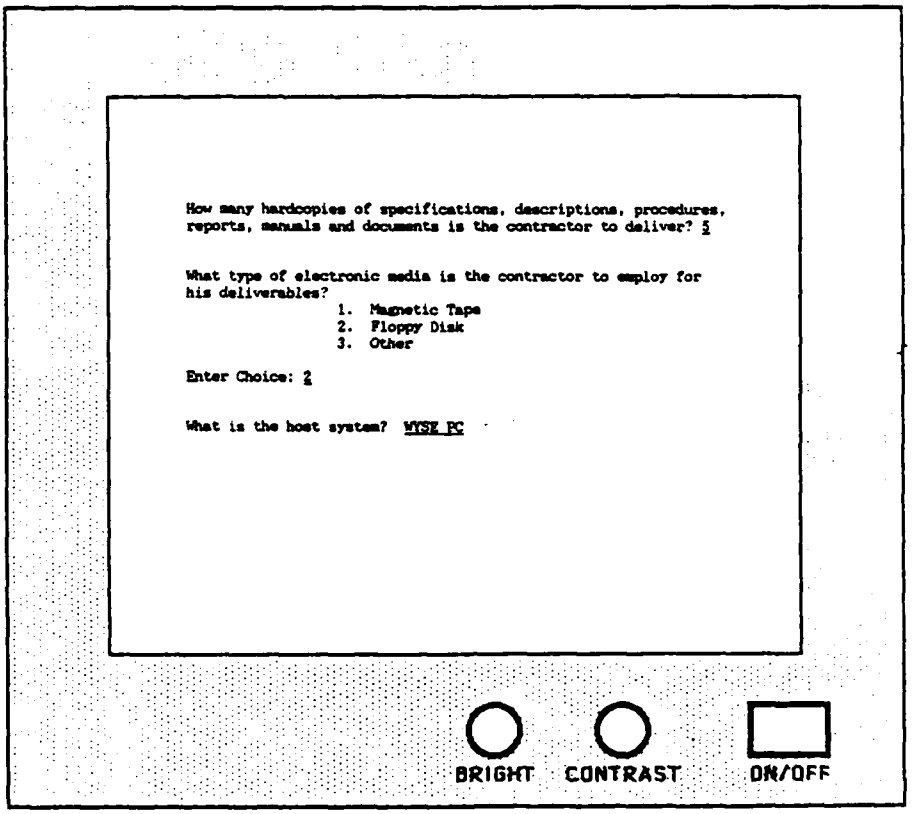
The contractor shall provide all necessary personnel, supervision, management, materials, services, equipment, and facilities to perform software .... etc.

4. CDRL - File created by READER containing the Form 1423 information. Here is a sample:

```
Form 1423 data:   1423 data for paragraph 1000.00
  BLOCK 2 -- Software Development Plan
  BLOCK 3 -- SDP
  BLOCK 4 -- DI-MCCR-80030
  BLOCK 6 -- STRBE-TQR
  BLOCK 7 -- DD
  BLOCK 8 -- A
  BLOCK 10 -- ONE/R
  BLOCK 12 -- See Item 16
  BLOCK 13 -- See Item 16
  BLOCK 15 -- Total
  BLOCK 16 -- Draft plan shall be submitted NLT 30 days after contract award.
              Allow 30 days for Gov't review/comments.  Revised SDP due NLT
              30 days after receipt of Gov't comments.  Changes/Revisions shall
              be submitted as change pages for approval.  Reproducible;
              Electronic Media.
```

READER begins by displaying an introduction and then asking the user some questions:

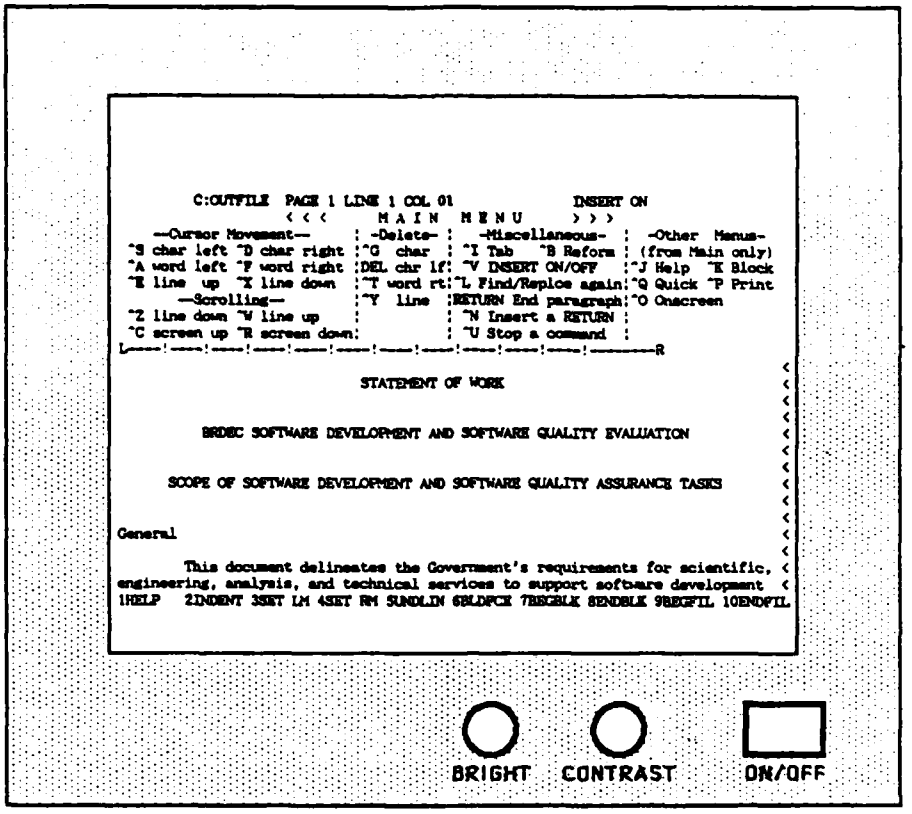




The program then echoes back the information to make sure it is correct. If all is fine, answer YES to continue.

The program then continues processing the data. When it is finished it prompts the user to hit RETURN and continues with the batch file.

The batch file is set up to copy both OUTFILE and CDRL to the Wordstar directory. (This is the word processor we used. However, it can be easily changed to accomodate other packages.) Wordstar is then called up and OUTFILE is opened and appears on the screen:



Any changes or modifications to the tailored Statement of Work can be easily made with the word processor. After OUTFILE has been edited and printed out, the same can be done for the CDRL file. For further instructions on the word processor or operating system, refer to the appropriate user's manuals.

NOTE: It is advisable to rename both OUTFILE and CDRL in the word processor because each time SQA is run, it creates new files for OUTFILE and CDRL and overwrites the old ones.

That completes the batch file. A tailored Statement of Work has been produced.

END

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